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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/751,215	12/29/2000	Andrew Yeoh	042390.P10048	8879

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11/05/2003

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EXAMINER

VU, HUNG K

ART UNIT

PAPER NUMBER

2811

DATE MAILED: 11/05/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/751,215

Applicant(s)

YEOH, ANDREW

Examiner

Hung K. Vu

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 09 April 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,3-7 and 18-21 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,5,6,18,19 and 21 is/are rejected.
- 7) ☒ Claim(s) 3,4,7 and 20 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

Request for Continued Examination

1 A request for continued examination (RCE) under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant' submission filed on 04/15/03 has been entered. An action on the RCE follows.

Claim Objections

2. Claims 4-6 are objected to because of the following informalities:
- In claim 4, line 2, "copper" should be changed to "metal" for clarity.
- In claim 5, line 2, "layers" should be changed to "film" for clarity.
- In claim 5, line 8, "layer" should be changed to "film" for clarity.
- In claim 6, line 1, "layer" should be changed to "film" for clarity.
- Appropriate correction is required.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

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(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claim 1 is rejected under 35 U.S.C. 102(e) as being anticipated by Hsiung et al. (PN 6,174,812).

Hsiung et al. discloses, as shown in Figures 3C-3D, a method for forming hardened interconnects comprising:

depositing a metal layer (35) comprising copper and an additional metal species over a semiconductor wafer surface wherein the copper and the additional metal species are co-deposited;

after co-depositing the metal layer comprising the copper and the additional species performing chemical-mechanical polishing of the deposited metal layer comprising copper and the additional metal species. Note that Hsiung et al. teaches the metal layer comprising copper and additional metal species, therefore, it is inherent that the additional metal species hardens the deposited metal layer to reduce the rate of the polishing. [Col. 3, lines 31-43 and Col. 3, line 59-Col. 4, line 3]

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 5 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hsiung et al. (PN 6,174,812) in view of Besser (PN 6,368,967).

With regard to claim 5, Hsiung et al discloses all of the claimed limitations except the steps of after allowing the heated metal film to cool performing the chemical-mechanical polishing.

However, Besser discloses the steps of after allowing the heated metal film to cool performing the chemical-mechanical polish. Note Figure 7 and Col. 8, lines 52-63 of Besser. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the metal layer of Hsiung et al. including the steps of after allowing the heated metal film to cool performing the chemical-mechanical polishing, such as taught by Besser in order to reduce the hydrostatic mechanical stress of the metal film.

With regard to claim 6, Hsiung et al. and Besser disclose the deposited metal layer is copper.

5. Claims 18, 19 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hsiung et al. (PN 6,174,812) in view of Pramanick et al. (PN 6,117,770, of record).

With regard to claim 18, Hsiung et al. discloses, as shown in Figures 3C-3D, a method for forming interconnects of integrated circuit comprising:

forming an opening in an insulating film (30);

co-depositing a metal film and an additional metal species (35) over insulating layer and in the opening and filling the opening with the metal film and the additional metal species;

after co-depositing the metal film and the additional metal species into the opening, chemical-mechanical polishing of the deposited metal film with the additional metal species to

remove the metal film from over the insulating layer. [Col. 3, lines 31-43 and Col. 3, line 59- Col. 4, line 3]

Hsiung et al. discloses all of the claimed limitations except the insulating film formed over a substrate. However, Pramanick et al. disclose forming an opening in an insulating film (202) formed over a substrate (200). Note Figures 2-4 of Pramanick et al.. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the insulating layer of Hsiung et al. over a substrate, such as taught by Pramanick et al. because it is conventional to form the substrate used as a base layer for form other subsequent layers on the base layer.

With regard to claim 19, Hsiung et al. and Pramanick et al. disclose the metal film comprises copper.

With regard to claim 21, Hsiung et al. and Pramanick et al. disclose the method further comprising heating the deposited metal film with the introduced metal species prior to performing the chemical mechanical polishing.

Allowable Subject Matter

6. Claims 3-4, 7 and 20 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

7. The following is an examiner's statement of reasons for allowance:

Applicant's claims 3-4, 7 and 20 are allowable over the references of record because none of these references disclose or can be combined to yield the claimed method for forming hardened interconnects comprises additional metal species being beryllium.

Response to Arguments

8. Applicant's arguments with respect to claims 1, 5 and 18 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hung K. Vu whose telephone number is (703) 308-4079. The examiner can normally be reached on Mon-Thurs 6:00-3:30, alternate Friday 7:00-3:30, Eastern Time.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie C. Lee can be reached on (703) 308-1690. The Central Fax Number for the organization where this application or proceeding is assigned is (703) 872-9306.

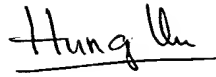
Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

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Vu

October 27, 2003

A handwritten signature in cursive script, appearing to read "Hung Vu", written over a horizontal line.

Hung Vu

Patent Examiner